General Specifications

Item	Specification
Lubricants	
Super premium SAE 5W-20 Engine Oil XO-5W20-DSP	WSS-M2C914-A
Penetrating and Lock Lubricant E8AZ-19A501-B	N/A
Pipe Sealant with Teflon D8AZ-19554-A	WSK-M26350-A2

Torque Specifications

Description	Nm	lb-ft	lb-in
Cylinder head temperature (CHT) sensor — 3.8L	10	—	89
Engine coolant temperature (ECT) sensor — 4.6L (2V)	20	—	15
Engine coolant temperature (ECT) sensor — 4.6L (4V)	24	18	—
Heated oxygen sensors (HO2S)	41	30	—
Catalyst monitor sensors	41	30	—
Crankshaft position (CKP) sensor bolts — 3.8L	6	—	53
Crankshaft position (CKP) sensor bolts — 4.6L	10	—	89
Power steering reservoir bolts	10	—	89
Camshaft position (CMP) sensor bolt — 4.6L	10	—	89
PCM connector to module bolt	6	—	53
Idle air control (IAC) valve bolts	10	—	89
Camshaft synchronizer housing bolt	25	18	—
Throttle position (TP) sensor screws	3	—	27
Fuel pressure sensor bolts	4	—	35
Air intake scoop bolts	25	18	—
Air intake scoop bracket bolt	25	18	—
Air intake scoop bracket nuts	25	18	—
Air intake scoop bracket throttle body nut	9	—	80
Exhaust gas recirculation (EGR) vacuum regulator solenoid bolts	10	—	89

Electronic Engine Controls

The electronic engine controls consist of the following:

- powertrain control module (PCM)
- throttle position (TP) sensor
- idle air control (IAC) valve
- engine coolant temperature (ECT) sensor
- cylinder head temperature sensor
- camshaft position (CMP) sensor
- crankshaft position (CKP) sensor
- mass air flow (MAF) sensor
- intake air temperature (IAT) sensor
- heated oxygen sensor (HO2S) — front
- catalyst monitor sensor — rear
- wheel speed sensor

The powertrain control module needs the following inputs to calibrate the engine correctly:

- crankshaft position
- engine rpm
- engine load (manifold pressure)
- atmospheric (barometric) pressure
- engine coolant temperature

The throttle position sensor:

- sends the powertrain control module a signal indicating the throttle plate angle.
- is the main input to the powertrain control module from the driver.

The idle air control valve:

- controls bypass air around the throttle plate at low speeds.
- is controlled by the powertrain control module.

The cylinder head temperature sensor:

- provides a gauge signal for coolant temperature.
- is mounted on rear of LH cylinder head.
- sends the powertrain control module a signal indicating engine temperature.
- resistance decreases as coolant temperature increases.

The camshaft position sensor:

- sends the powertrain control module a signal indicating camshaft position, used for fuel synchronization.

The crankshaft position sensor:

- sends the powertrain control module a signal indicating crankshaft position.
- is essential for calculating spark timing.

The mass air flow sensor:

- sends the powertrain control module a signal indicating mass air flow rate of air entering the engine.

The intake air temperature sensor:

- sends the powertrain control module a signal indicating the temperature of the air entering the engine.

The heated oxygen sensor:

- has the ability to create a voltage signal depending on exhaust oxygen content.
- provides feedback information to the powertrain control module used to calculate fuel delivery.

The rear catalyst monitor sensor:

- monitors oxygen content after the oxygen flows through the catalytic converter.
- provides a voltage to the powertrain control module used to calculate catalytic converter integrity.

The wheel speed sensor:

- sends a signal to the powertrain control module indicating wheel speed.

Electronic Engine Controls —Cobra

Most of the Cobra engine electronic controls are similar to that of the non-supercharged 4.6L (2V) engine. These components are as follows:

- Crankshaft position (CKP) sensor
- Throttle position (TP) sensor
- Idle air control (IAC) valve
- Mass air flow (MAF) sensor
- Heated oxygen sensors (HO2S)
- Engine coolant temperature (ECT) sensor

There are also three controls that are unique to the Cobra engine. These are as follows:

- Integrated temperature and manifold absolute pressure (T-MAP) sensor
- Supercharger bypass vacuum solenoid
- Supercharger bypass vacuum solenoid — actuator

Supercharger Bypass Vacuum Solenoid and Actuator

The Supercharger bypass vacuum solenoid will bleed off boost under the following conditions:

- heavy engine misfire
- engine coolant over-temperature
- loss of intercooler fluid
- pump failure

This prevents damage that can occur if boost were allowed under these conditions. The solenoid is located on the upper LH side of the engine. The solenoid uses engine vacuum to operate a actuator and linkage that connects to the pressure bleed off valve. The actuator is located near the solenoid and is connected to it by a vacuum line.

Integrated Temperature and Manifold Absolute Pressure (TMAP) Sensor

The TMAP sensor is located on the upper LH side of the engine and is used to measure current manifold absolute pressure and manifold air charge temperature.

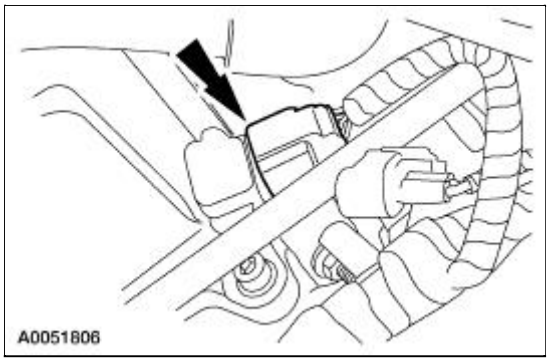
Electronic Engine Controls

Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

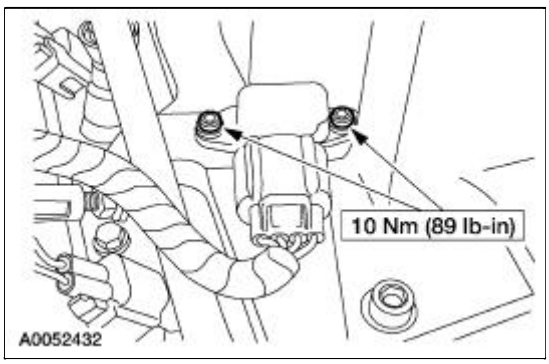
Temperature and Manifold Absolute Pressure (T-MAP) Sensor —Cobra

Removal and Installation

1. Disconnect the temperature manifold absolute pressure (T-MAP) sensor electrical connector.



2. Remove the bolts and the T-MAP sensor.

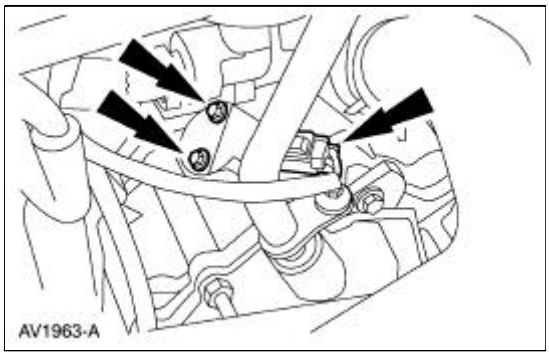


3. To install, reverse the removal procedure.

Camshaft Position (CMP) Sensor —3.8L

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the camshaft position (CMP) sensor.
   - Disconnect the connector.
   - Remove the bolts and the sensor.



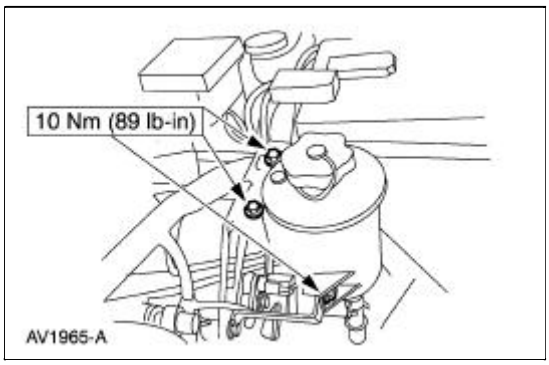
Installation

1. To install, reverse the removal procedure.

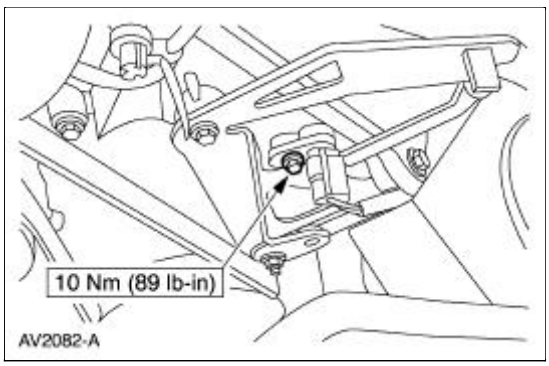
Camshaft Position (CMP) Sensor —4.6L

Removal and Installation

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the bolts and position aside the power steering pump reservoir.



3. Remove the camshaft position (CMP) sensor.
   - Disconnect the connector.
   - Remove the bolt and the sensor.

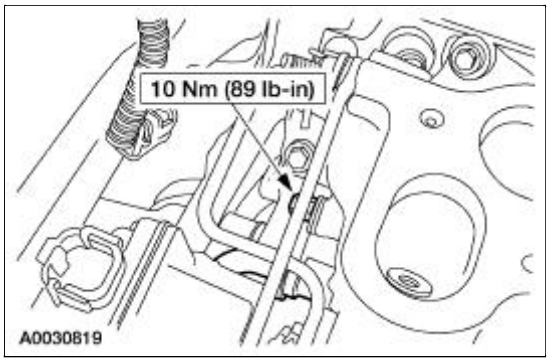


4. To install, reverse the removal procedure.

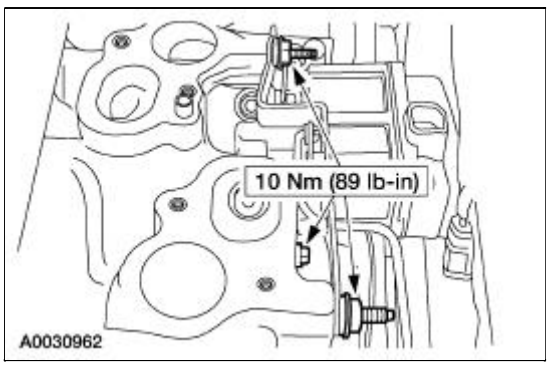
Intake Manifold Runner Control (IMRC) Actuator —3.8L

Removal and Installation

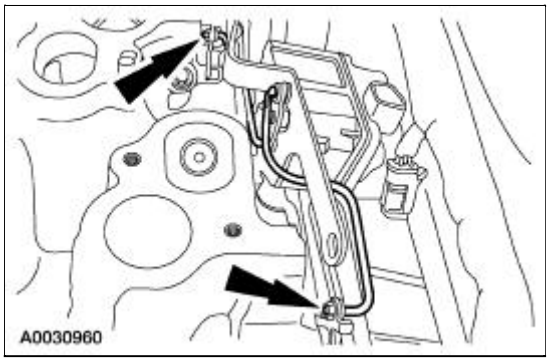
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Drain the cooling system. For additional information, refer to Section 303-03A .
3. Remove the upper intake manifold. For additional information, refer to Section 303-01A .
4. Remove the fuel injector supply manifold. For additional information, refer to Section 303-04A .
5. Remove the coolant bypass tube. For additional information, refer to Section 303-03A .
6. Remove the bolt and heater water inlet tube at the back of the lower intake.



7. Remove the two stud bolts and one bolt. Position the actuator aside.



8. Disconnect the linkage and remove the actuator.



9. **NOTE:** New plastic IMRC retainers must be installed any time an IMRC rod is removed.

   NOTE: Before installing the IMRC actuator, be sure to rotate the motor driver plate until the levers make contact with the set screws, then rotate the motor until the motor bracket bolt holes line up with the tapped holes in the lower intake manifold.

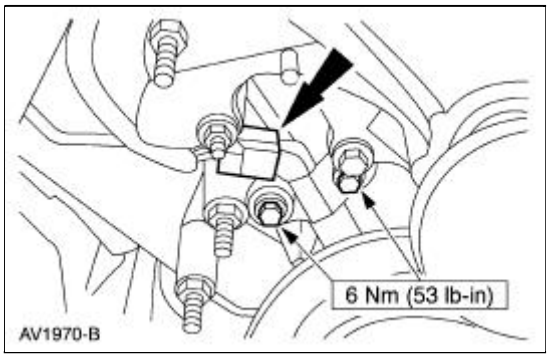
   NOTE: Discard O-ring and install a new O-ring on the heater inlet tube. Lubricate the O-ring with engine coolant prior to installation.

   To install, reverse the removal procedure.

Crankshaft Position (CKP) Sensor —3.8L

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the crankshaft position (CKP) sensor.
   - Disconnect the connector.
   - Remove the bolts and the sensor.



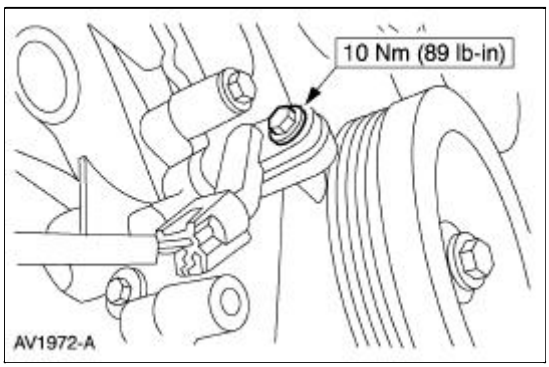
Installation

1. To install, reverse the removal procedure.

Crankshaft Position (CKP) Sensor —4.6L

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the A/C compressor. For additional information, refer to Section 412-03 .
3. Remove the crankshaft position (CKP) sensor.
   - Disconnect the connector.
   - Remove the bolt and remove the sensor.



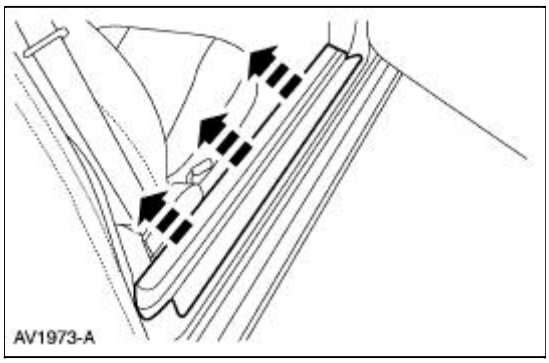
Installation

1. To install, reverse the removal procedure.

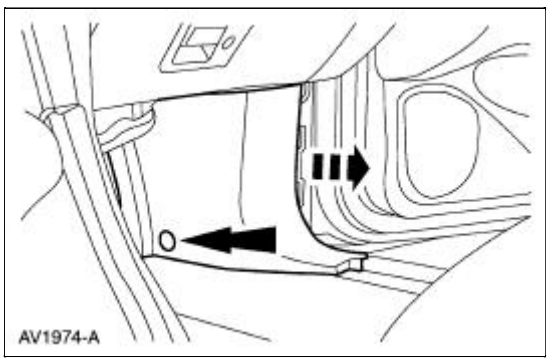
Powertrain Control Module (PCM)

Removal

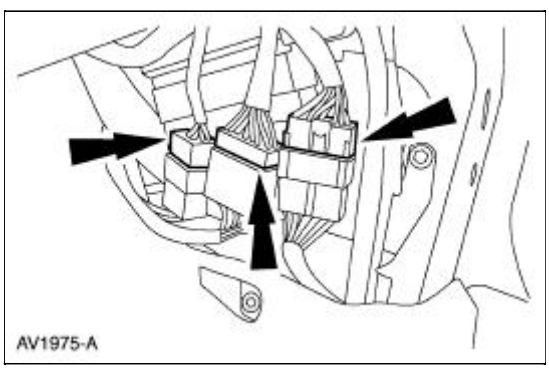
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the RH front door scuff plate.



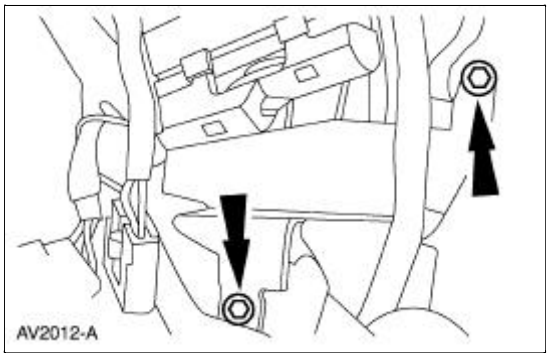
3. Remove the RH cowl side trim panel.
   - Remove the pin-type retainer.
   - Remove the panel.



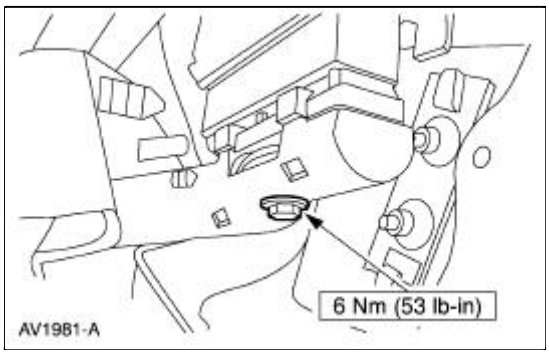
4. Disconnect the connectors and position them aside.



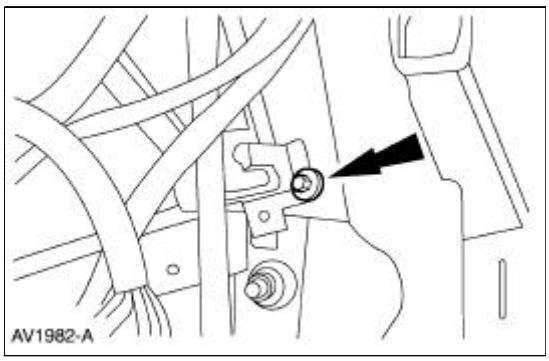
5. Remove the bolts and the bracket.



6. Loosen the bolt and remove the connector.



7. Remove the bolt and the powertrain control module (PCM).



Installation

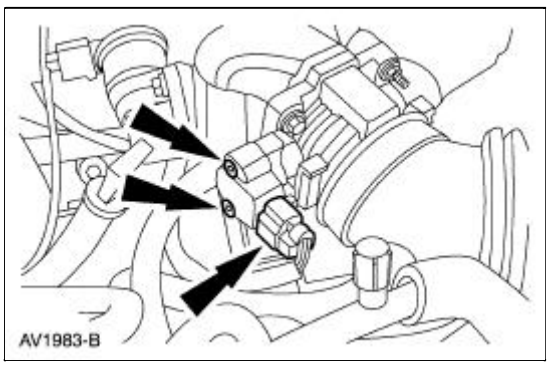
1. To install, reverse the removal procedure.

Throttle Position (TP) Sensor

Removal

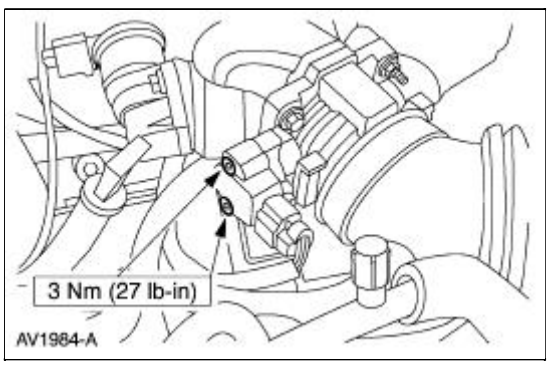
NOTE: The 3.8L engine is shown; the 4.6L (2V) is similar.

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the throttle position (TP) sensor.
   - Disconnect the connector.
   - Remove the screws, and remove the sensor.



Installation

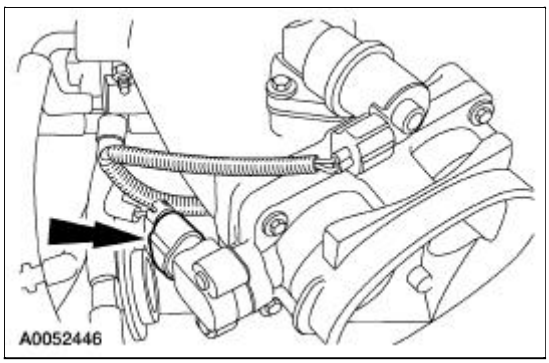
1. To install, reverse the removal procedure.



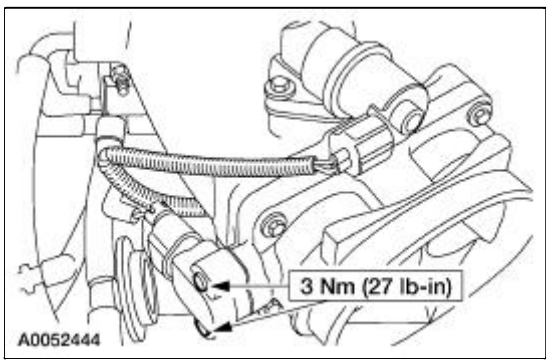
Throttle Position (TP) Sensor —Cobra

Removal and Installation

1. Disconnect the throttle position (TP) sensor electrical connector.



2. Remove the bolts and the TP sensor.

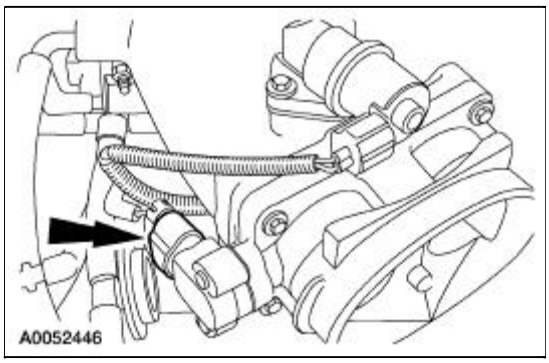


3. To install, reverse the removal procedure.

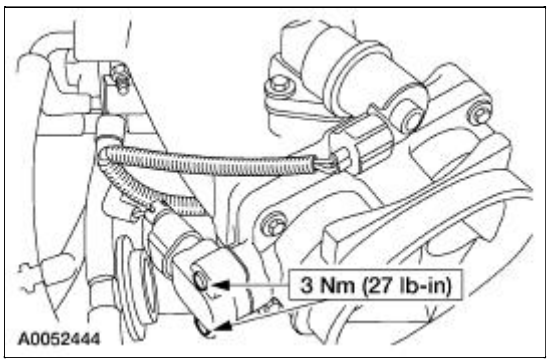
Throttle Position (TP) Sensor —Mach I

Removal and Installation

1. Remove the air intake scoop bracket. For additional information, refer to Section 303-12 .
2. Disconnect the throttle position (TP) sensor electrical connector.



3. Remove the bolts and the TP sensor.



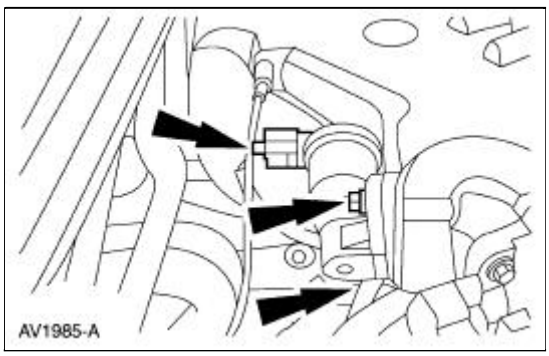
4. To install, reverse the removal procedure.

Idle Air Control (IAC) Valve —3.8L

Removal

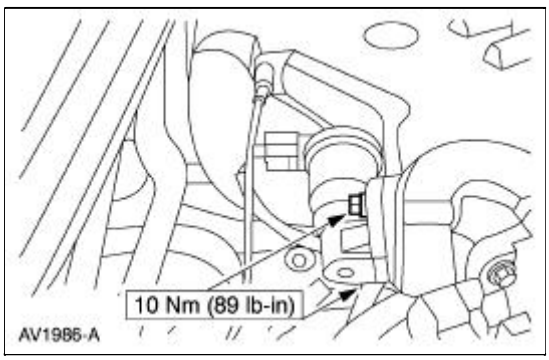
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. **NOTE:** Discard the idle air control (IAC) valve gasket.

   Remove the IAC valve.
   - Disconnect the connector.
   - Remove the two bolts, the IAC valve and the gasket.



Installation

1. To install, reverse the removal procedure.

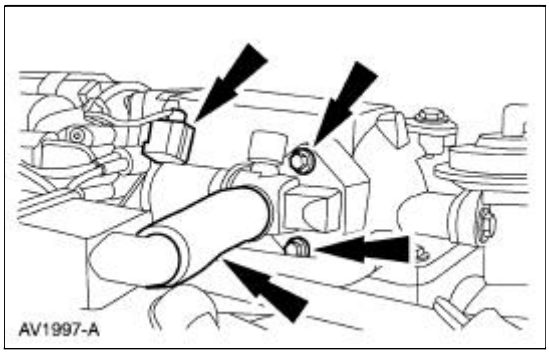


Idle Air Control (IAC) Valve —4.6L (2V)

Removal

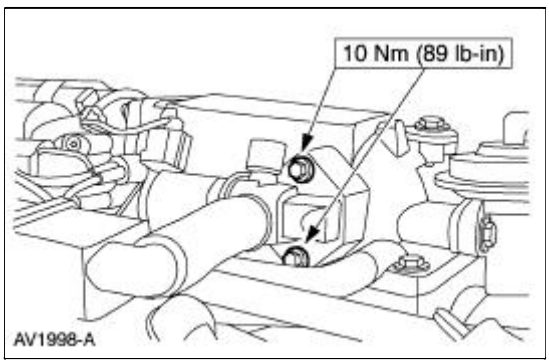
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. **NOTE:** Discard the idle air control (IAC) valve gasket.

   Remove the IAC valve.
   - Disconnect the connector.
   - Disconnect the hose.
   - Remove the bolts, the IAC valve and the gasket.



Installation

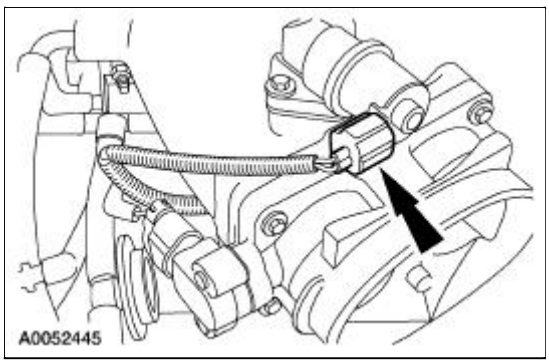
1. To install, reverse the removal procedure.



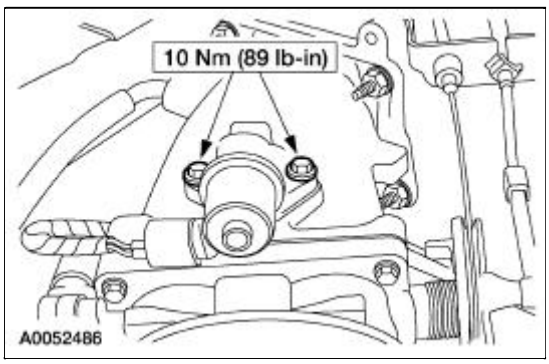
Idle Air Control (IAC) Valve —Cobra

Removal and Installation

1. Disconnect the idle air control (IAC) valve electrical connector.



2. Remove the bolts, the IAC valve and the gasket.



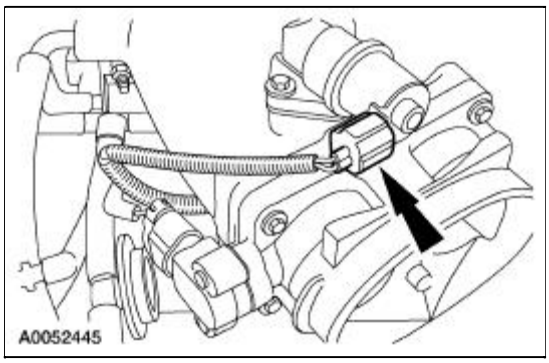
3. **NOTE:** Install a new gasket if necessary.

   To install, reverse the removal procedure.

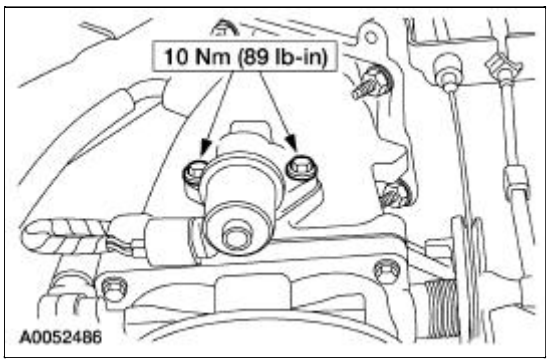
Idle Air Control (IAC) Valve —Mach I

Removal and Installation

1. Remove the air intake scoop. For additional information, refer to Section 303-12 .
2. Disconnect the idle air control (IAC) valve electrical connector.



3. Remove the bolts, the IAC valve and the gasket.



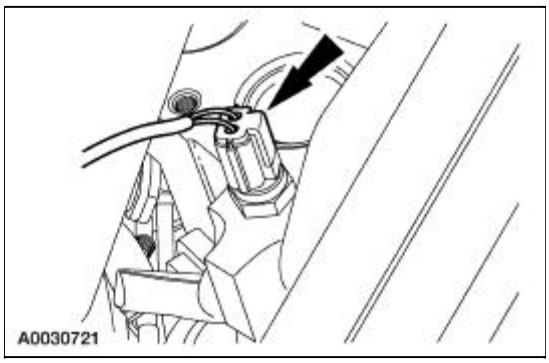
4. **NOTE:** Install a new gasket if necessary.

   To install, reverse the removal procedure.

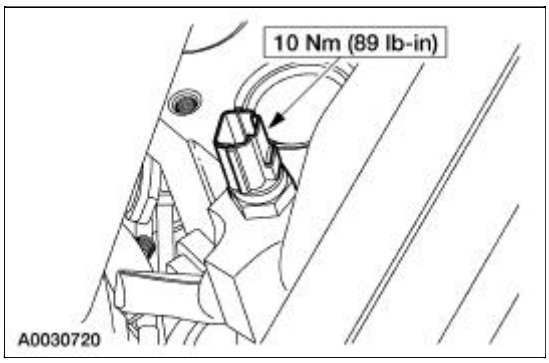
Cylinder Head Temperature (CHT) Sensor —3.8L

Removal

1. Disconnect the battery ground cable. For additional information refer to Section 414-01 .
2. Disconnect the cylinder head temperature sensor connector.



3. Remove the CHT sensor.



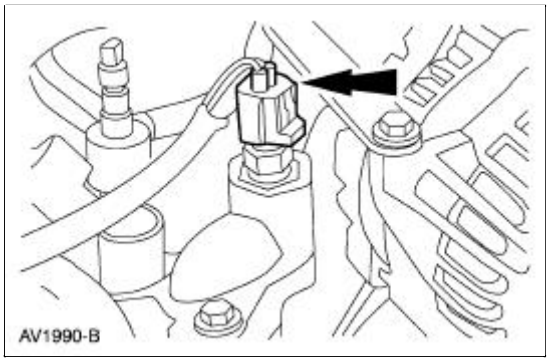
Installation

1. To install, reverse the removal procedure.

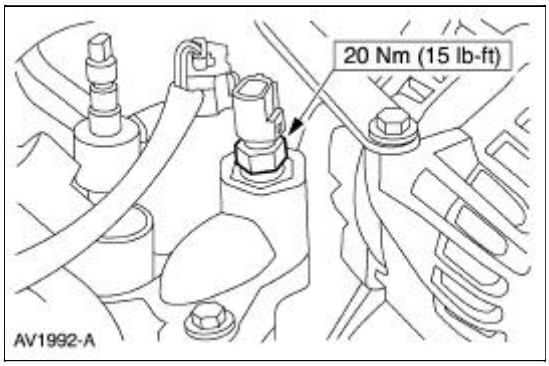
Engine Coolant Temperature (ECT) Sensor —4.6L (2V)

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Partially drain the cooling system. For additional information, refer to Section 303-03A .
3. Disconnect the engine coolant temperature (ECT) sensor (12A648) connector.



4. Remove the ECT sensor.



Installation

1. To install, reverse the removal procedure.

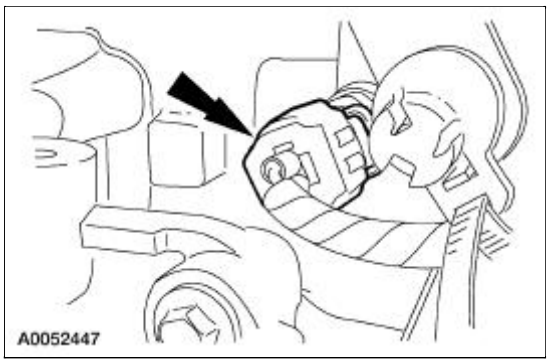
Engine Coolant Temperature (ECT) Sensor —Cobra

Material

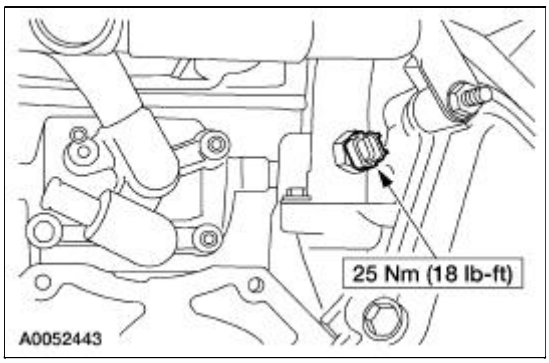
Item	Specification
Pipe Sealant with Teflon D8AZ-19554-A	WSK-M2G350-A2

Removal and Installation

1. Partially drain the engine cooling system. For additional information, refer to Section 303-03A .
2. Disconnect the engine coolant temperature (ECT) sensor electrical connector.



3. Remove the ECT sensor.



4. To install, reverse the removal procedure.
   - Apply sealant to the ECT sensor threads.

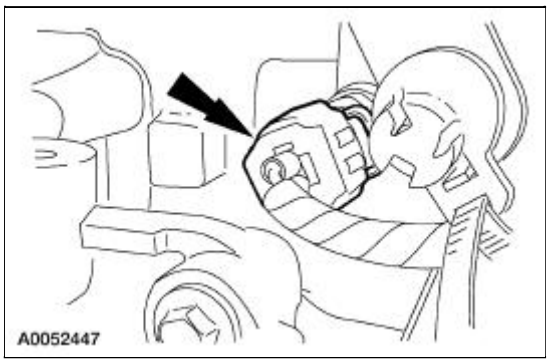
Engine Coolant Temperature (ECT) Sensor —Mach I

Material

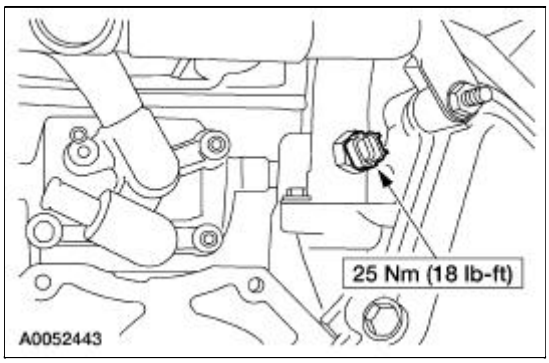
Item	Specification
Pipe Sealant with Teflon D8AZ-19554-A	WSK-M2G350-A2

Removal and Installation

1. Remove the air intake scoop. For additional information, refer to Section 303-12 .
2. Partially drain the engine cooling system. For additional information, refer to Section 303-03A .
3. Disconnect the engine coolant temperature (ECT) sensor electrical connector.



4. Remove the ECT sensor.



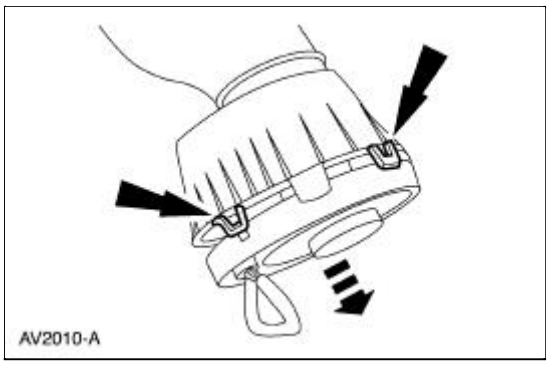
5. To install, reverse the removal procedure.
   - Apply sealant to the ECT sensor threads.

Mass Air Flow (MAF) Sensor —3.8L

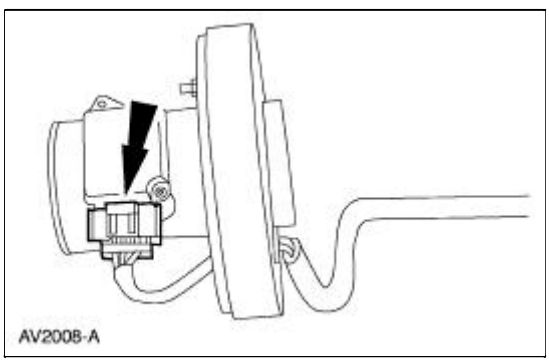
Removal

CAUTION: The mass air flow (MAF) sensor hot wire sensing element and housing are calibrated as a unit and must be repaired as a complete assembly. Do not damage the sensing element (internal to housing) or possible failure to the mass air flow sensor may occur.

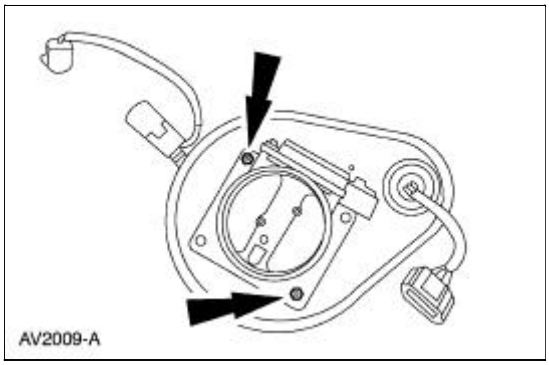
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the air cleaner and duct assembly. For additional information, refer to Section 303-12 .
3. Release the four tabs and remove the mass air flow (MAF) sensor.



4. Disconnect the connector.



5. Remove the mass air flow sensor (MAF).
   - Remove the nuts and the MAF sensor.



Installation

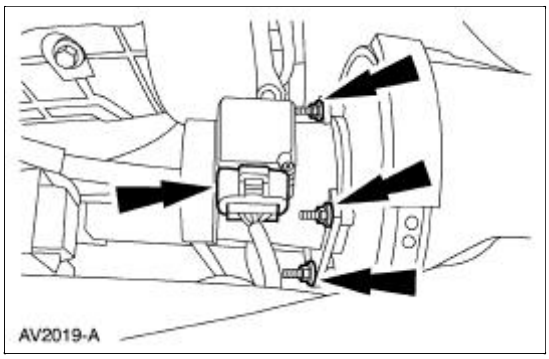
1. To install, reverse the removal procedure.

Mass Air Flow (MAF) Sensor —4.6L (2V)

Removal

CAUTION: The mass air flow (MAF) sensor hot wire sensing element and housing are calibrated as a unit and must be repaired as a complete assembly. Do not damage the sensing element (internal to housing) or possible failure to the mass air flow sensor may occur

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the air cleaner outlet tube. For additional information, refer to Section 303-12 .
3. Remove the mass air flow sensor (MAF).
   - Disconnect the connector.
   - Remove the four nuts and the MAF sensor.



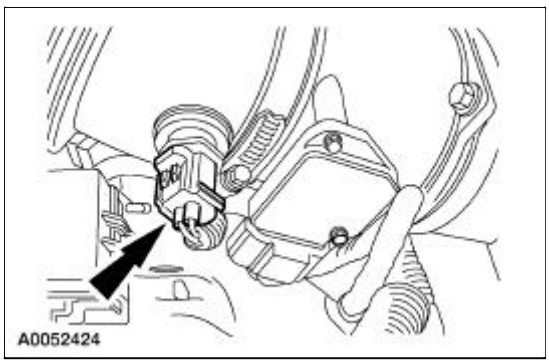
Installation

1. To install, reverse the removal procedure.

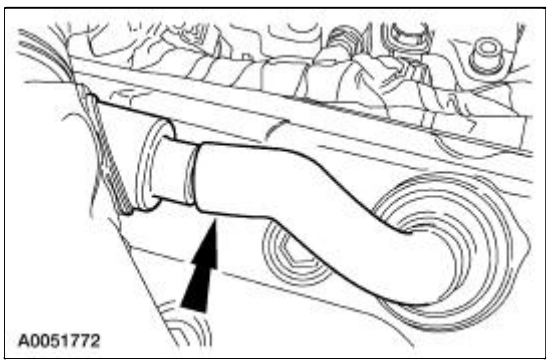
Mass Air Flow (MAF) Sensor —Cobra

Removal and Installation

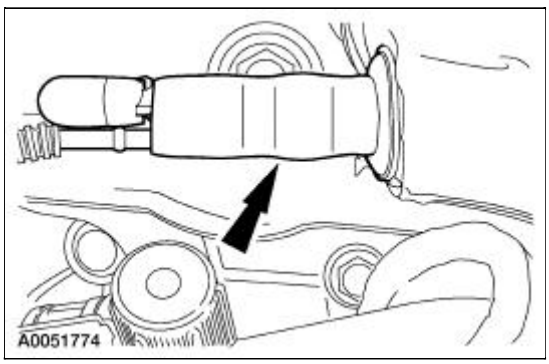
1. Disconnect the intake air temperature (IAT) sensor.



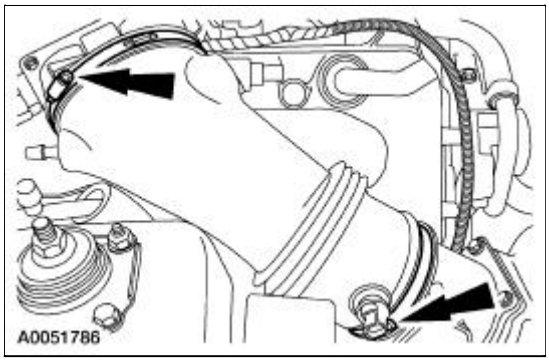
2. Disconnect the breather hose.



3. Disconnect the vacuum hose.



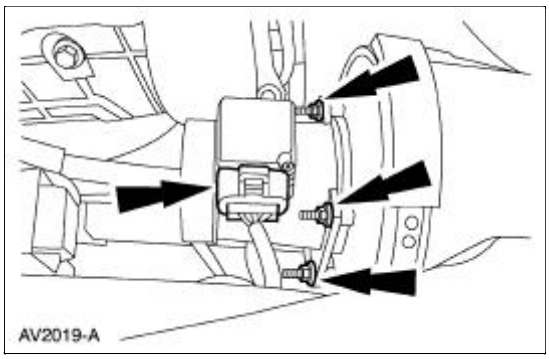
4. Loosen the clamps and remove the air cleaner outlet pipe.



5. **CAUTION: The mass air flow (MAF) sensor hot wire sensing element and housing are calibrated as a unit and must be repaired as a complete assembly. Do not damage the sensing element (internal to housing) or possible failure to the mass air flow sensor can occur.**

   Remove the mass air flow sensor.

   - Disconnect the MAF sensor electrical connector.
   - Remove the bolts and the MAF sensor.



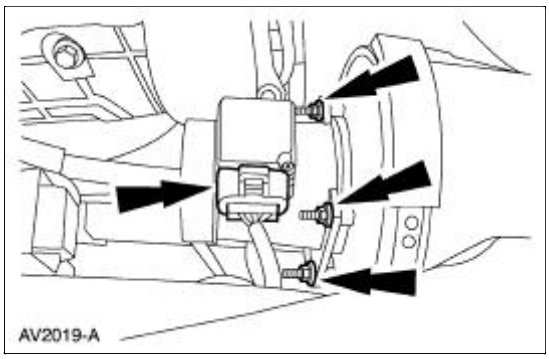
6. To install, reverse the removal procedure.

Mass Air Flow (MAF) Sensor —Mach I

Removal

CAUTION: The mass air flow (MAF) sensor hot wire sensing element and housing are calibrated as a unit and must be repaired as a complete assembly. Do not damage the sensing element (internal to housing) or possible failure to the mass air flow sensor may occur

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Remove the air cleaner outlet tube. For additional information, refer to Section 303-12 .
3. Remove the mass air flow sensor (MAF).
   - Disconnect the connector.
   - Remove the four nuts and the MAF sensor.



Installation

1. To install, reverse the removal procedure.

Heated Oxygen Sensor (HO2S)

Special Tool(s)

ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

Material

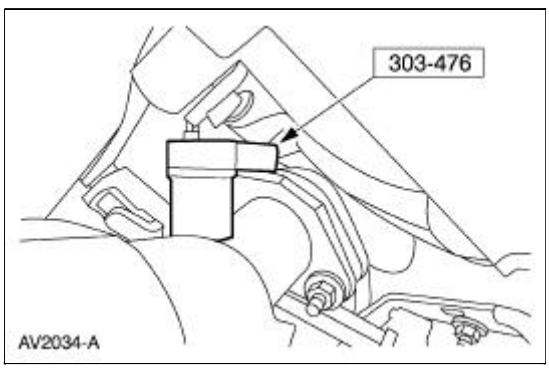
Item	Specification
Penetrating and Lock Lubricant or equivalent	E8AZ-19A501-B

Removal and Installation

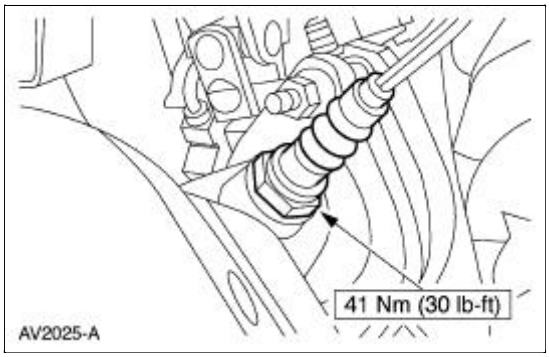
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Raise and support the vehicle. For additional information, refer to Section 100-02 .
3. **NOTE:** Two heated oxygen sensors (HO2S) are used for the engine control system. They are located in the dual converter Y pipe. The left side (HO2S) is shown, the right side is similar.

   Disconnect the HO2S electrical connector.
4. **NOTE:** If necessary, lubricate the heated oxygen sensors with penetrating and lock lubricant to assist in removal.

   Using the special tool, remove the HO2S from the dual converter Y pipe.

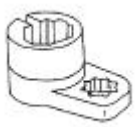


5. To install, reverse the removal procedure.


41 Nm (30 lb-ft)
AV2025-A

Catalyst Monitor Sensor

Special Tool(s)

 ST1447-A	Socket, Exhaust Gas Oxygen Sensor 303-476 (T94P-9472-A)

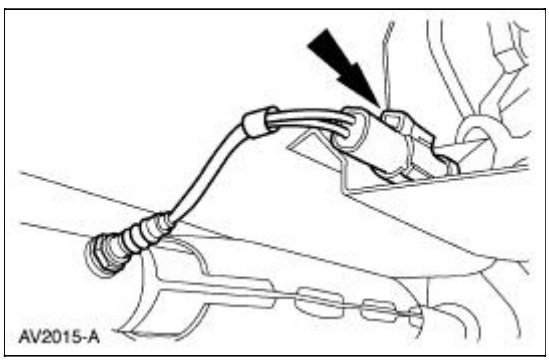
Material

Item	Specification
Penetrating and Lock Lubricant or equivalent	E8AZ-19A501-B

Removal and Installation

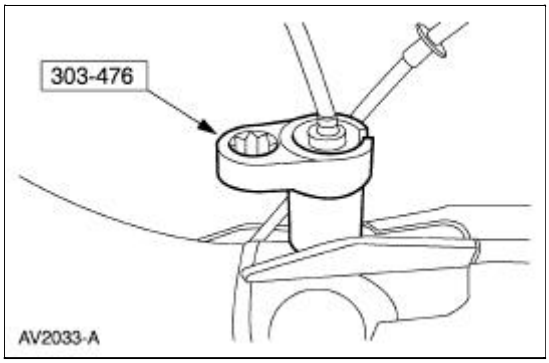
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Raise and support the vehicle. For additional information, refer to Section 100-02 .
3. **NOTE:** Two catalyst monitor sensors are used for the engine control system. They are located in the dual converter Y pipe downstream from the catalyst. The left side catalyst monitor sensor is shown, the right side is similar.

   Disconnect the connector.

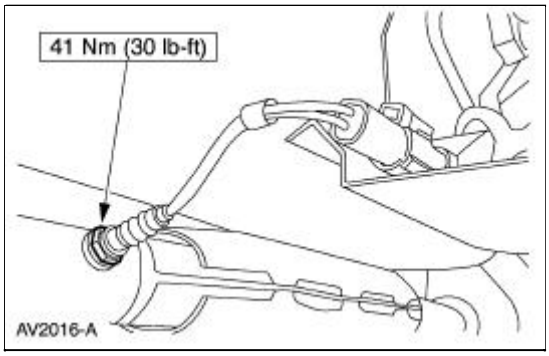
   

4. **NOTE:** If necessary, lubricate the sensors with penetrating and lock lubricant to assist in removal.

   Using the special tool, remove the catalyst monitor sensors from the dual converter Y pipe.



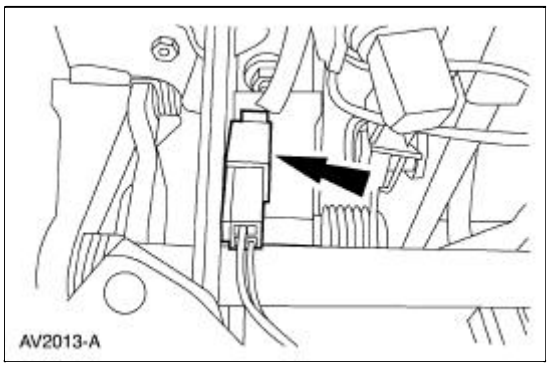
5. To install, reverse the removal procedure.



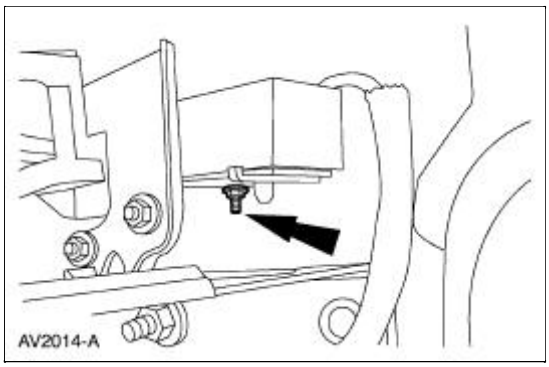
Clutch Pedal Position (CPP) Switch

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section 414-01 .
2. Disconnect the connector.



3. Remove the bolt and the clutch pedal position (CPP) switch.



Installation

1. To install, reverse the removal procedure.

Fuel Pressure Sensor

Material

Item	Specification
Super Premium SAE 5W-20 Motor Oil XO-5W20-DSP or equivalent	WSS-M2C914-A

Removal

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before working on or disconnecting any of the fuel lines or fuel system components, the fuel system pressure must be relieved. Failure to follow these instructions may result in personal injury.

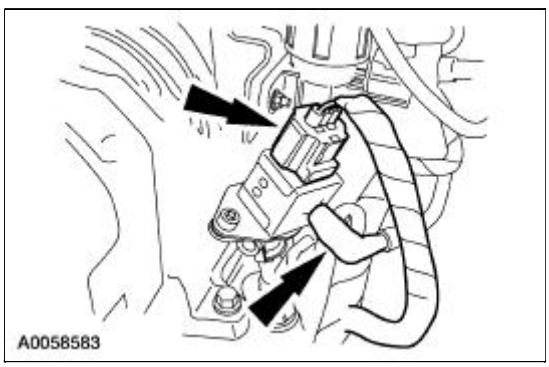
Mach I

1. Remove the air intake scoop. For additional information, refer to Section 303-12 .

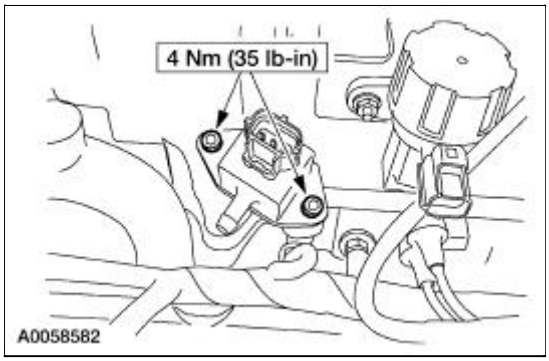
All engines

2. Relieve the fuel pressure. For additional information, refer to Section 310-00 .
3. **NOTE:** The 4.6L (4V) Cobra engine is shown, the other engines are similar.

   Disconnect the connector and the vacuum line.

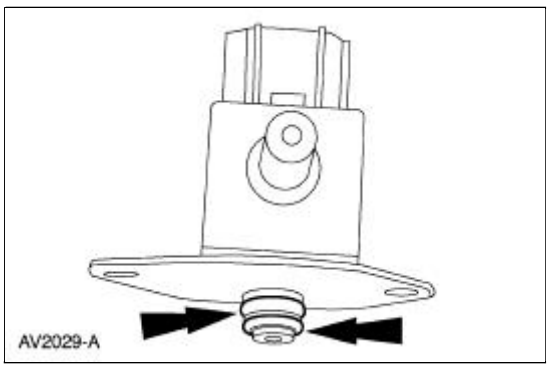


4. Remove the bolts and the sensor.



Installation

1. Inspect the O-rings, and install new O-rings if necessary.



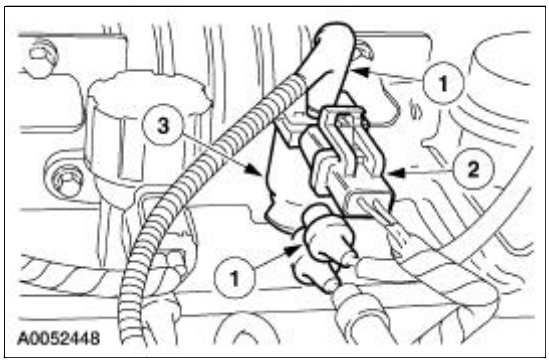
2. **NOTE:** Lubricate the new O-rings with clean engine oil to aid installation.

   To install, reverse the removal procedure.

Supercharger Bypass Vacuum Solenoid

Removal and Installation

1. Remove the supercharger bypass vacuum solenoid.
    1. Disconnect the vacuum hoses.
    2. Disconnect the electrical connector.
    3. Unclip the supercharger bypass vacuum solenoid from the vacuum accessory bracket.

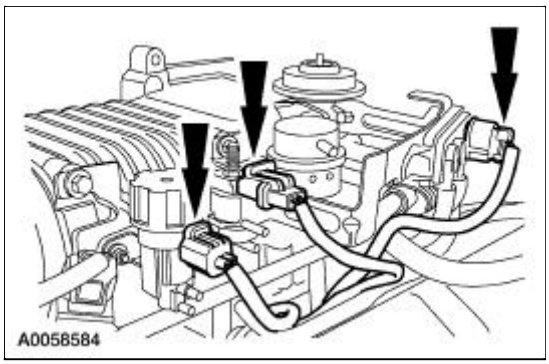


2. To install, reverse the removal procedure.

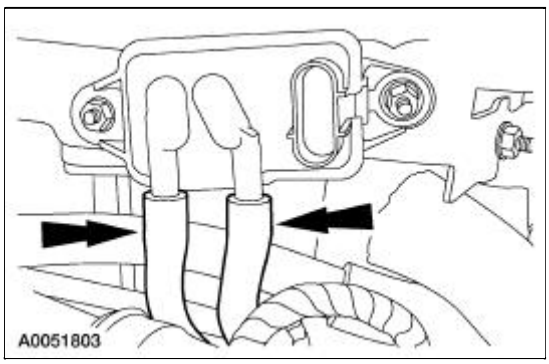
Supercharger Bypass Vacuum Solenoid —Actuator

Removal

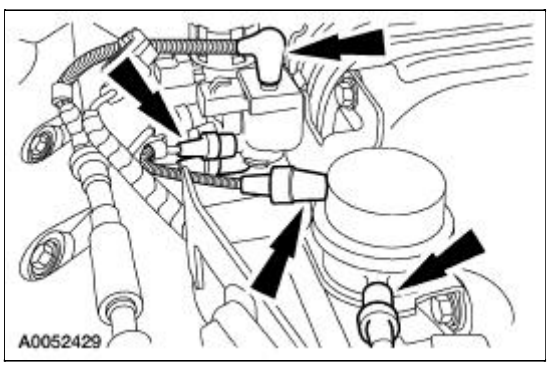
1. Disconnect the electrical connectors from the EGR vacuum regulator solenoid, the supercharger bypass vacuum solenoid, and the differential pressure feedback EGR system.



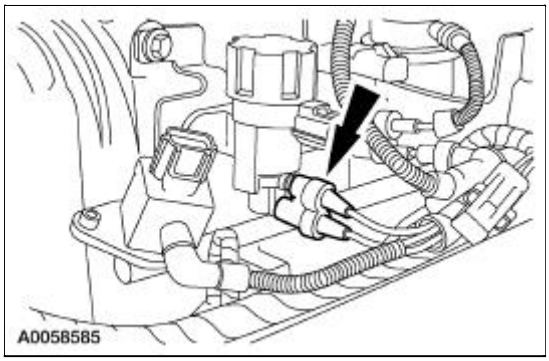
2. Disconnect the vacuum hoses from the differential pressure feedback EGR system.



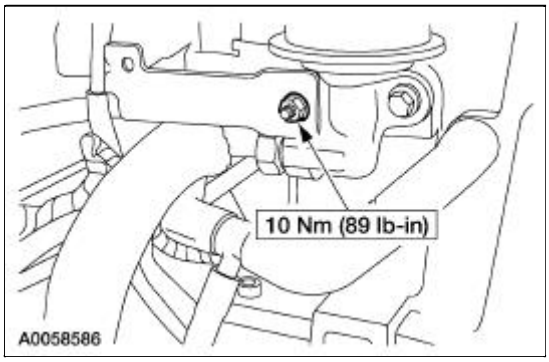
3. Disconnect the vacuum hoses from the supercharger bypass vacuum solenoid, and the actuator.



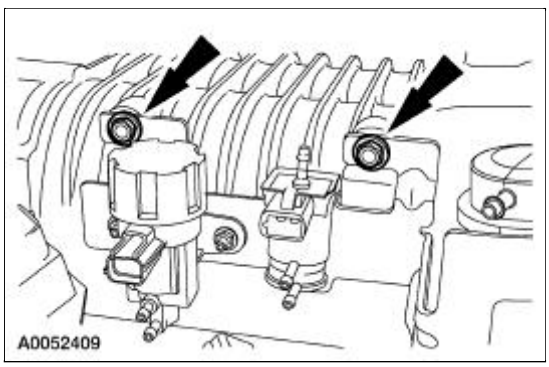
4. Disconnect the vacuum hoses from the EGR vacuum regulator solenoid.



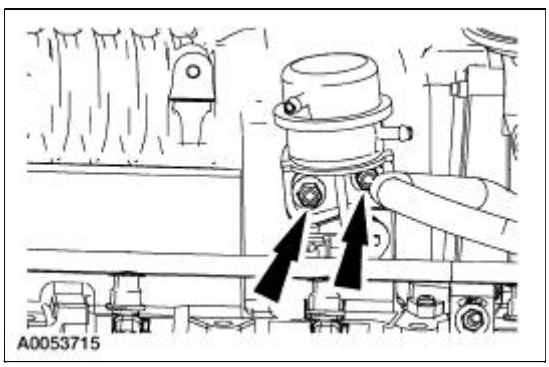
5. Remove the vacuum accessory bracket mounting nut.



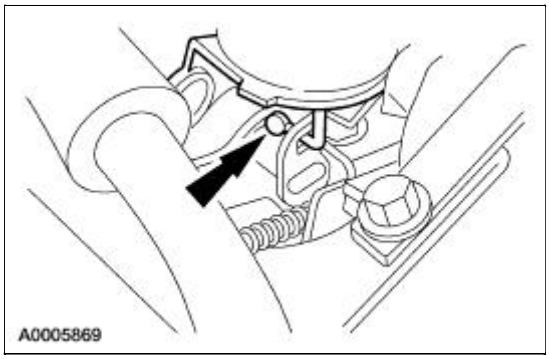
6. Remove the mounting bolts and the vacuum accessory bracket.



7. Remove the actuator mounting bolts.



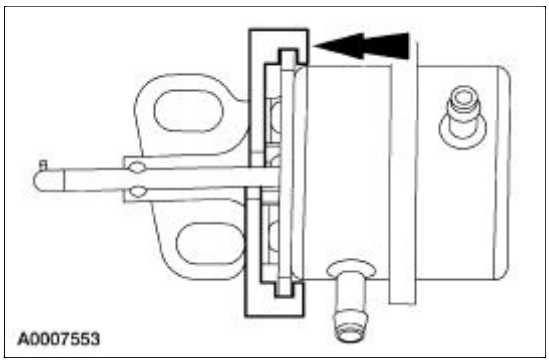
8. Align the actuator rod with the slot in the actuator linkage, and remove the actuator.



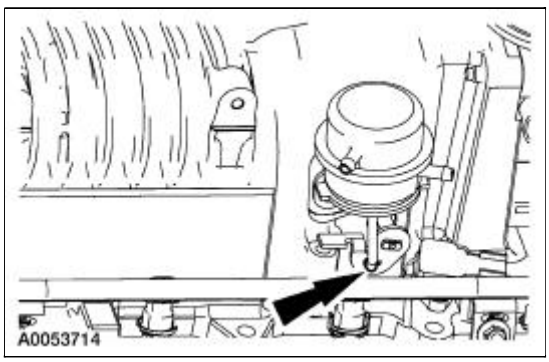
Installation

1. **CAUTION: The actuator adjustment tool included with the replacement actuator kit must be used when installing the supercharger bypass vacuum actuator. Failure to correctly adjust the actuator will result in incorrect operation of the supercharger assembly.**

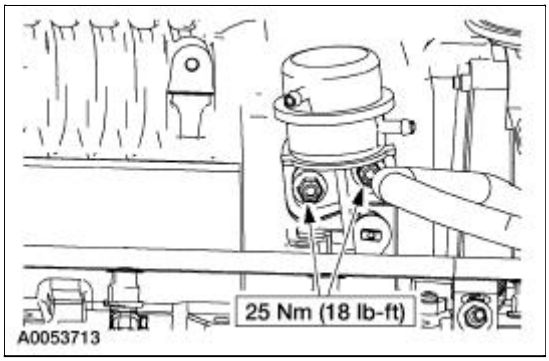
   Install the actuator adjustment tool onto the actuator, making sure the tool is correctly attached to the actuator rod. rotate the actuator into position until the rod engages the lever.



2. Install the actuator.
   - Align the actuator rod with the slot in the linkage.

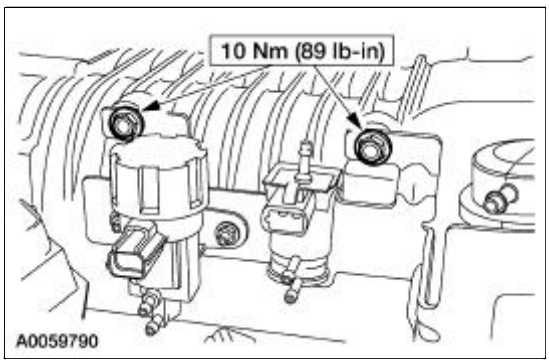


3. Install the actuator bolts.

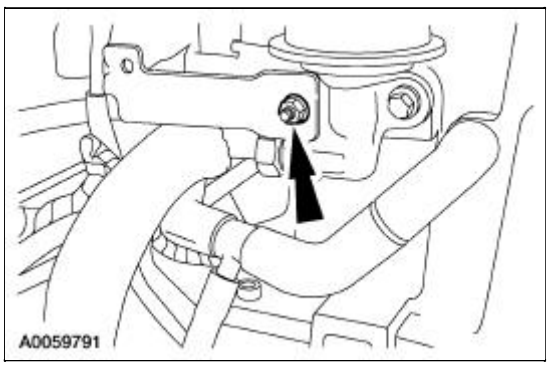


4. Remove the actuator adjustment tool.

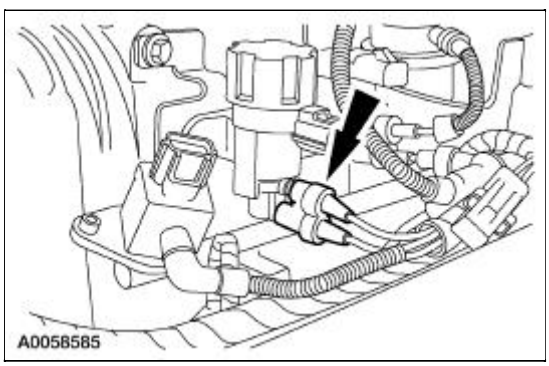
5. Install the vacuum accessory bracket, and the mounting bolts.



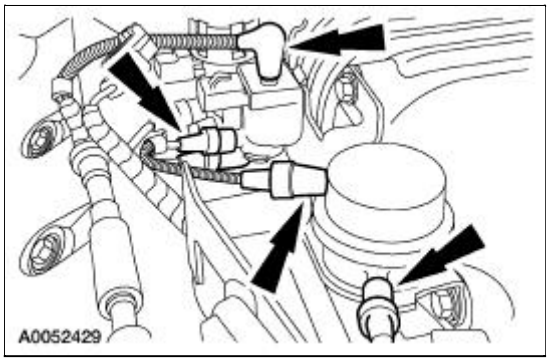
6. Install the vacuum accessory bracket mounting nut.



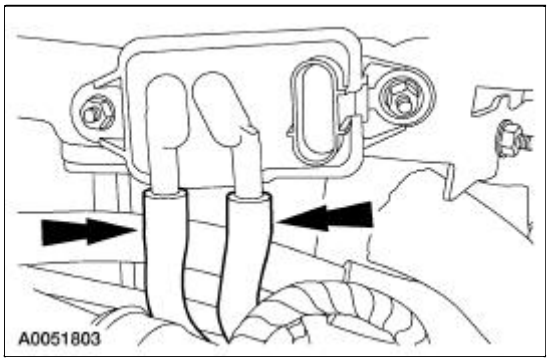
7. Connect the vacuum hoses to the EGR vacuum regulator solenoid.



8. Connect the vacuum hoses to the supercharger bypass vacuum solenoid, and the actuator.



9. Connect the vacuum hoses to the differential pressure feedback EGR system.



10. Connect the electrical connectors to the EGR vacuum regulator solenoid, the supercharger bypass vacuum solenoid, and the differential pressure feedback EGR system.